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## PATENT SPECIFICATION



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### PROVISIONAL SPECIFICATION.

No. 15,761, A.D. 1926.

#### Improvements in Bobbins or like Bodies of Yarn or Thread and in the Winding of and Mechanism for Winding such Bobbins or like Bodies of Yarn or Thread.

I, GRINDROD KERSHAW, of Atlas Iron Works, Whitworth Road, Rochdale, in the County of Lancaster, of British nationality, do hereby declare the nature of this invention to be as follows:—

This invention of improvements in bobbins or like bodies of yarn or thread and in the winding of and mechanism for winding such bobbins or like bodies of yarn or thread relates to the formation of, to the method of winding and to mechanism for winding bobbins or like bodies of the form comprising coils or layers of yarn wound in successive series one over or around another and each comprising a group of coils or layers of different lengths of traverse from a position at one end and made to vary in length of traverse from that position by increasing from a minimum and gradually increasing to a maximum and then beginning again from the minimum or by diminishing gradually from a maximum to a minimum and beginning again at the maximum or by beginning with a minimum and gradually increasing to a maximum and then diminishing again gradually to the minimum or by beginning with a maximum and gradually diminishing to a minimum and then gradually increasing again to a maximum so that the successive series of groups of coils or layers differing in length of traverse form a bobbin or body widest at one end or at one end and for part of its length therefrom and narrowing for the rest of its length to the other end. A bobbin or body of yarn or thread of this form is commonly known as a bottle bobbin. It has been found in bobbins or bodies of this form as hitherto wound especially of slippery yarn, for example of artificial silk,

there is a risk of the layers, coils or windings of yarn slipping or shelling off from those over or around which they are wound and causing difficulty and inconvenience in the handling transport or carriage and eventual unwinding of the bobbins or the like bodies. The object of this invention is to provide bobbins or like bodies of yarn or thread generally of the said form but in which the coils or layers or windings wound over or around others shall bind or lock them firmly in position until they are released through yarn or thread being unwound from such bobbins or like bodies and a method of and means for winding yarn or thread into bobbins or the like with coils or layers or windings so binding or locking other over or around which they are wound.

According to this invention a bobbin or like body of yarn or thread is formed of coils layers or windings each of which extending for a greater or less length along the bobbin or like body comprises overlapping spirals or coils of opposite hand while the coils, layers or windings each comprising overlapping spirals or coils of opposite hand are made to extend along different lengths of the bobbins or the like in successive series each comprising a number of coils, layers or windings of different lengths extending from points at or near one end of the bobbin or like body for different distances towards or to the other end of such bobbin or body generally in a succession of layers or windings increasing gradually or approximately gradually from an approximate minimum to an approximate maximum and then diminishing gradually or approximately gradually to an approximate minimum or diminishing gradually from an

[Price 1/-]

approximate maximum to an approximate minimum and then increasing again gradually or approximately gradually to an approximate maximum or beginning at an approximate minimum and increasing gradually or approximately gradually to an approximate maximum and then beginning again at an approximate minimum or beginning at an approximate maximum and diminishing gradually or approximately gradually to an approximate minimum and then beginning again at an approximate maximum.

The guidance of the yarn or thread in the formation of the spirals of opposite hand in the several coils, layers or windings modifying and being modified by the effect of the guidance of the yarn or thread for the various distances along the length of the bobbin or the like body in different ways according to the relations between the lengths of the spirals of opposite hand and the lengths of the coils, layers or windings which, including the spirals of opposite hand, extend along more or less of the length of the bobbin or like body will introduce more or less variation or departure from regularity of gradual increase or gradual decrease of length of successive coils, layers or windings as the case may be and in the position of the ends of such coils, layers or windings at the smaller end of the bobbin or like body. If the formation of the spirals of opposite hand in the several coils, layers or windings is made to extend in a more or less approximately similar way throughout the whole extent of the coils, layers or windings the ends of the coils, layers or windings, at the larger end of the bobbin or like body will be in various positions some precisely at and others more or less distant from the extremity of the larger end of the bobbin or like body which will then be more or less tapering or conoidal in form as is desirable for some purposes. In the formation of a bobbin or like body with an approximately flat larger end the guidance of the yarn or thread to and fro for the formation of the spirals of opposite hand in the several coils, layers or windings extending more or less along the bobbin is reduced in extent or omitted gradually or abruptly, during the winding of the portions of these coils, layers or windings at and near more or less to the larger end of the bobbin or like body.

In the method of winding bobbins or like bodies of yarn or thread adopted according to this invention the formation of the coils, layers or windings extending along different extents of the lengths of the bobbins or like bodies is effected by means of any suitable traverse motion or mechanism similar in effect to that used in the formation of coils, layers or windings extending along

different extents of the length of bottle bobbins of more or less analogous form as heretofore made and in addition to or in combination with this traverse motion or mechanism is provided supplementary mechanism which will impart to the guide or guides for guiding yarn or thread on to bobbins or like bodies of yarn or the spindles or other bodies on which they are to be wound the movement requisite to form spirals of opposite hand of the kind intended in each such coil, layer or winding.

The mechanism provided according to this invention for the purpose of winding bobbins or like bodies of yarn or thread comprising coils, layers or windings extending along different lengths of the bobbins or like bodies and each comprising spirals of opposite hand comprises a guiding means for yarns or threads as for example a guide rod or guide rods, a rail or rails carrying guides with eyes or notches or a rail or rails carrying rings used with revolving travellers which is or are carried by and made movable relatively to a movable support or supports moved by means of any suitable traverse motion or mechanism similar in effect to that used in the formation of coils, layers or windings extending along different extents of the length of bottle bobbins of general form more or less analogous to that of the bobbins or like bodies to be formed by the mechanism provided according to this invention and is or are made to reciprocate in relation thereto in any suitable way by means of a crank, cam or other mechanism made to receive motion in any suitable manner. The reciprocating movement of the yarn guiding means relatively to the movable support or supports carrying it or them is made uniform or constant at all times or may be varied more or less by the movement of the movable support or supports or is made to vary in extent or frequency or extent and frequency according to the manner in which the overlapping spirals of opposite hand are to be formed in the different coils, layers or windings in order to form bobbins or other bodies of yarn of the shape intended.

In one form of mechanism forming an example of mechanism provided according to this invention, a guide rail is mounted by means of pivots on arms pivoted to supports moved up and down through different distances by means of a traverse motion of any appropriate kind similar to any of those used in machines for winding bottle bobbins as hitherto made, and a crank carried by one of the said supports and made to revolve is connected by a connecting rod to the rail so as to raise and lower it relatively to the supports. The short shaft carrying the crank is mounted to be revolved in a bearing in the support or a bracket thereon and

provided with a toothed wheel into which gears or engages a toothed wheel to which a pulley is fastened. A band being led around this pulley and around another pulley mounted to revolve on the said support is led around guide pulleys mounted to revolve on stationary supports provided in the machine of which the mechanism forms part and around a pulley for driving it provided in any convenient position in the machine. During the working of the traverse motion the band transmits revolution to the pulley fastened to a toothed wheel and by means of the crank and connecting rod causes the guide rail to reciprocate up and down relatively to the movable supports while such supports are being raised and lowered. The mechanism forms bobbins or like bodies of yarn more or less taper or conoidal at their larger ends.

In another mechanism forming a further example of mechanism provided according to this invention, a cam or cams axially movable and made to revolve and more or less approximately in the form of an eccentric or eccentrics of the same minimum radius at all parts of its or their length but on its or their parts of greater radius increasing in one direction from the minimum radius or from a minimum eccentricity to a suitably greater eccentricity or radius is or are mounted and made movable axially in movable supports moved up and down by means of an appropriate traverse motion similar to any of those used in machines for winding bottle bobbins as hitherto made. A stationary incline or inclines usually with a spring or springs to co-operate with it or them is or are provided for moving the cam or cams axially in one direction and effecting or allowing it or them to be moved in the opposite direction as the supports are raised and lowered. The incline or inclines may be contrived to move the cam or cams progressively throughout the upward movement of the supports or only until some stage in that upward movement is attained in which case a suitable guide or guides is or are provided for holding the

cam or cams stationary against axial movement in movement of the supports beyond that stage in upward movement and until a corresponding stage in the downward movement is attained. The cam or cams is or are made to revolve by any suitable means for example similar to those used for revolving the crank herein before mentioned. A roller or rollers or other part or parts to be moved by means of the cam or cams is or are connected to yarn guiding means movable up and down relatively to the said supports such as a guide rod or guide rods or T shaped or other guides carried on arms or levers. The cam or cams being revolved and also being moved axially in one direction as the supports are raised and in the opposite direction as the supports are lowered will move the thread guiding means up and down relatively to the supports little or not at all when the supports are at or near the bottom of their movement and increasingly either to the end of the upward movement of the supports or to a maximum extent at some stage in the upward movement and diminishingly throughout or from a certain stage in the downward movement of the supports so as to reduce to very little or nothing the up and down movement of the thread guiding means relatively to the supports as and when the supports are made to complete their downward movements. This mechanism forms bobbins or like bodies of yarn or thread with flat or nearly flat larger ends.

The details of mechanisms provided according to this invention will differ widely in different cases in correspondence with the machines in which such mechanisms are to be applied and the forms of the bobbins or other like bodies of yarn or thread to be wound in such machines.

Dated this 22nd day of June, 1926.

HOWARD CHEETHAM,  
Chartered Patent Agent,  
Manchester,  
Agent for the Applicant.

# PROVISIONAL SPECIFICATION.

No. 10,968, A.D. 1927.

## Improvements in Bobbins or like Bodies of Yarn or Thread and in the Winding of and Mechanism for Winding such Bobbins or like Bodies of Yarn or Thread.

I, GRINDROD KERSHAW, of Atlas Iron Works, Whitworth Road, Rochdale, in the County of Lancaster, of British nationality,

do hereby declare the nature of this invention to be as follows:—

This invention of improvements in bob-

bins or like bodies of yarn or thread and in the winding of and mechanism for winding such bobbins or like bodies of yarn or thread relates to an improved formation of, to a method of winding and to mechanism for winding in an improved form bobbins or like bodies of yarn or thread which as formed hitherto are formed of coils, windings or layers of yarn or thread extending in spirals of comparatively small inclination from end to end of the mass of yarn in any such bobbin or the like or from or to places at or near one end to or from places at or more or less near the other end.

One example of bobbins or like bodies of yarn or thread as hitherto formed to the improvement of which this invention is directed, is the bobbins commonly called "bottle bobbins" in which yarn or thread is wound in successive coils or windings or layers of different lengths extending for different distances from one end of the space occupied by the yarn or thread towards or to the other end of that space so that the wound mass is larger at one end than at the other.

Another example of bobbins or like bodies of yarn or thread as hitherto formed to the improvement of which this invention is directed, is the bobbins commonly called "warpers' bobbins" in which yarn or thread is laid or wound in successive coils or windings or layers extending from end to end of the space occupied by the yarn or thread.

It has been found in the winding, handling, transport, arrangement and eventual unwinding of bobbins or bodies of yarn of these forms as hitherto wound that, especially in the case of slippery yarn, for example of artificial silk, there is a risk of layers, coils or windings of yarn slipping or "shelling" off from those around or over which they are wound or of yarn being drawn in and held between portions of coils previously wound so that difficulty and inconvenience have consequently been caused in the handling, transport or carriage and eventual unwinding of the bobbins or like bodies.

In the Provisional Specification filed with Application for Letters Patent No. 15,761 dated June 23rd 1926 are described bobbins or like bodies of yarn or thread generally of the form commonly called "bottle" bobbins but wound in an improved form in which each coil, winding or layer extending from or to a place at or near one end of the bobbin or like body of yarn for a greater distance to or from the other end thereof comprises spirals of opposite hands and the said Provisional Specification also describes a method of and mechanism for winding "bottle" bobbins of the improved form.

The defects and inconveniences found in

the use of "bottle" bobbins or like bodies of yarn or thread of the forms previously wound which are mentioned in the said Provisional Specification are presented also in warpers' bobbins or like bodies of yarn of the forms hitherto provided and the principal object of this invention is to provide warpers' bobbins or like bodies of yarn or thread in which the coils or layers of yarn wound over or around others shall bind or lock them firmly in position until they are released through yarn or thread being unwound from such bobbins or like bodies and a method of and means for winding yarn or thread into bobbins or the like with coils or layers or windings so binding or locking others over or around which they are wound.

A further object of this invention is to enable the mechanism described in the Provisional Specification aforesaid which comprises a cam axially movable while revolving to be used in the formation of bobbins or like bodies of yarn or thread which while generally in the shape of the improved form of "bottle" bobbins described therein present larger ends diminishing towards their extremities.

This invention consists in part in warpers' bobbins or other like bodies of yarn or thread wound similarly to the aforesaid improved form of "bottle" bobbins in an improved form in which each coil, winding or layer extending along the whole or a greater or less portion of the length of any such bobbin or the like is made to contain spirals of opposite hand and in a method of winding the warpers' bobbins or other like bodies of yarn or thread in the improved form and mechanism for carrying out that method.

According to this invention a warpers' bobbin or like body of yarn or thread is formed of coils, layers or windings, each of which extending along the bobbin or like body for the whole extent or a greater or less length thereof comprises overlapping spirals or coils of opposite hand. The guidance of the yarn or thread in the formation of the spirals of opposite hand in the several coils, windings or layers modifies and is modified by the effect of the guidance of yarn or thread along the length of the bobbin or like body according to the relation between the lengths of the spirals of opposite hand and the length of the coils, windings or layers which including the spiral of opposite hand extend along more or less of the length of the bobbin or like body.

If the formation of the spirals of opposite hand in the several coils, windings or layers is made to extend in a more or less approximately similar way throughout the whole extent of the coils, windings or layers, the ends of the coils, windings or

layers at the ends of the bobbin or like body will be in various positions, some precisely at and others more or less distant from the extremities of the ends of the bobbin or like body which will then be more or less tapering or conoidal in form as is desirable for some purposes.

In the formation of a bobbin or like body with approximately flat ends the guidance of the yarn or thread to and fro for the formation of the spirals of opposite hand in the several coils, windings or layers extending along the bobbin is reduced in extent or omitted gradually or abruptly, during the winding of the portions of those coils, windings or layers at and near more or less to the ends of the bobbin or like body.

The method of winding bobbins or like bodies of yarn or thread provided according to this invention consists in imparting to the thread guide or thread guides from which yarn or thread passes to the wood or other bobbins or bodies on which it is to be wound, firstly, by means of part of thread guide operating mechanism, a movement alternately in opposite directions in the direction of the length of such bobbins or other bodies of uniform extent and secondly by means of other parts of thread guide operating mechanism, a movement alternately in opposite directions of greater frequency in the direction of the length of the bobbins or other bodies relatively to the various positions into which the said thread guide or thread guides is or are brought through the first named movement and in the case of bobbins or other bodies of yarn required to present square or flat or like ends at one end or both causing the movement of greater frequency to be diminished in extent to a minimum or to nothing towards or at the one end or both ends of the first named movement as the case may be.

The mechanism for winding bobbins or like bodies of yarn or thread provided according to this invention consists in thread guiding mechanism which comprises firstly, a part receiving and transmitting to a thread guide or thread guides a movement alternately in opposite directions in the direction of the length of the wood bobbins or other bodies to receive yarn or thread wound, corresponding in extent to the length of the portion to be occupied by yarn or thread and comprises secondly another part receiving a movement alternately in opposite directions of greater frequency and imparting to the thread guide or thread guides a movement alternately in opposite directions in the direction of the length of the bobbins or other bodies relatively to various positions into which the thread guides are brought by the movement of the first named part of the thread guiding mechanism

and in the case of mechanism for winding bobbins or like bodies required to present flat or square or approximately flat or square ends at one end or both comprises means either always to be in condition for action or to be sometimes in condition for action and at other times put out of condition for action and serving in action for diminishing to a minimum or to nothing the movement of greater frequency towards or at the one end or both ends of the movement of the part receiving and transmitting to the thread guide or thread guides the movement alternately in opposite directions corresponding to the length or the distance from end to end of the portions of wood bobbins or other bodies to be occupied by the yarn or thread wound on them. The mechanism may be constructed either for giving when requisite to the thread guide or thread guides a reciprocating movement alternately in opposite directions corresponding in extent to varying distances extending from and to one end or part of the length of the portions of wooden or other bobbins or other bodies to be occupied by yarn or thread in the case of "bottle" bobbins or like bodies of yarn or thread and to be put out of action when requisite so as to serve for winding sometimes "bottle" bobbins and like bodies of yarn or thread and at other times warpers' bobbins or other like bodies of yarn or thread or may be constructed always to wind bobbins or bodies of one or other of these kinds.

In one form of mechanism forming an example of mechanism provided according to this invention as aforesaid and itself forming part of the invention and also a modification of the form of mechanism described in the Provisional Specification aforesaid as comprising an axially movable cam made to revolve a cam axially movable and made to revolve and more or less approximately in the form of an eccentric of the same minimum radius at all parts of its length but on its parts of greater radius increasing in one direction from the minimum radius or from a minimum eccentricity to a suitably greater eccentricity or radius is mounted and made movable axially in a movable support or movable supports moved up and down by means of an appropriate traverse motion similar to any of those used in machines for winding "bottle" bobbins as hitherto made which for the formation of warpers' or like bobbins is made to give the support or supports a reciprocating movement of uniform extent as is commonly done by putting out of action means for giving a reciprocating movement of varying extent, and the cam being moved axially by means of stationary and oppositely directed inclines and a

spring to co-operate with it or them is made in its revolution and axial movement to move a thread guide or thread guides relatively to the said support or supports through different extents of movement increasing and diminishing from and to a minimum or to nothing in the movement of the support or supports from and to opposite ends of its or their movement. In any case in which the mechanism is to be used sometimes for forming bobbins or like bodies of yarn or thread with flat or square or like ends and sometimes for forming bobbins or like bodies of yarn or thread with ends diminishing in diameter towards their extremities at one end or both a device for example a stop collar adjustable in position is provided for holding the cam against axial movement. If the mechanism is to be used sometimes for winding yarn or thread into bottle bobbins or like bodies a single stationary incline is provided for use instead of the oppositely directed inclines for moving the cam. This form of mechanism forms bobbins or like bodies of yarn or thread with smaller and larger ends and flat or nearly flat larger ends or cylindrical bobbins flat or nearly flat at both ends or bobbins or like bodies diminishing towards each end from a more or less cylindrical larger part either more abruptly towards one end than towards the other or equally towards each end according to the manner in which

the cam and the mechanism for moving the supports carrying the cam are made to operate.

According to this invention for the purpose of forming "bottle" bobbins or like bodies of yarn with both ends diminishing in diameter towards their extremities the mechanism described in the Provisional Specification aforesaid which comprises an axially movable cam is provided with means for example an adjustable stop collar by which that cam may be held against or limited in axial movement and so when requisite can be made to impart to the thread guide or thread guides a reciprocating movement relatively to the support or supports carrying it or them throughout the whole extent of the movement of such support or supports.

The details of mechanisms provided according to this invention will differ widely in different cases in correspondence with the machines in which such mechanisms are to be applied and the forms of the bobbins or other like bodies of yarn or thread to be wound in such machines.

Dated this 23rd day of April, 1927.

HOWARD CHEETHAM,  
Chartered Patent Agent,  
Manchester,  
Agent for the Applicant.

#### COMPLETE SPECIFICATION.

#### Improvements in Bobbins or like Bodies of Yarn or Thread and in the Winding of and Mechanism for Winding such Bobbins or like Bodies of Yarn or Thread.

I, GRINDROD KERSHAW, of Atlas Iron Works, Whitworth Road, Rochdale, in the County of Lancaster, of British nationality, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

In the winding of cops of yarn or thread in which a comparatively slow progressive movement of the yarn guiding means in one direction is accompanied by a more rapid reciprocating movement thereof through a shorter range so that yarn or thread is laid in more or less conical layers use has been made or proposed of a guide in the form of a roller furnished with an inclined groove and revolved by contact with the spindle on which yarn or thread is being wound or the mass of yarn wound thereon and imparting to the yarn or thread a still more rapid reciprocating movement so that each of the

more or less conical layers of yarn or thread comprises spirals of opposite hand.

This invention of improvements in bobbins or like bodies of yarn or thread and in the winding of and mechanism for winding such bobbins or like bodies of yarn or thread relates to an improved formation of, to a method of winding and to mechanism for winding in an improved form bobbins or like bodies of yarn or thread which as formed hitherto are formed of coils, windings or layers of yarn or thread extending in spirals of comparatively small inclination from end to end of the mass of yarn in any such bobbin or the like or from or to places at or near one end to or from places at or more or less near the other end.

One example of bobbins or like bodies of yarn or thread as hitherto formed to the improvement of which this invention is directed, is the bobbins commonly called "bottle bobbins" in which yarn or thread



is wound in successive coils or windings or layers of different lengths extending for different distances from one end of the space occupied by the yarn or thread towards or  
5 to the other end of that space so that the wound mass is larger at one end than at the other.

Another example of bobbins or like bodies of yarn or thread as hitherto formed to the  
10 improvement of which this invention is directed, is the bobbins commonly called "warpers' bobbins" in which yarn or thread is laid or wound in successive coils or windings or layers extending from end to  
15 end of the space occupied by the yarn or thread.

It has been found in the winding, handling, transport, arrangement and eventual unwinding of bobbins or bodies of  
20 yarn of these forms as hitherto wound that, especially in the case of slippery yarn, for example of artificial silk, there is a risk of layers, coils or windings of yarn slipping or "shelling" off from those around or  
25 over which they are wound or of yarn being drawn in and held between portions of coils previously wound so that difficulty and inconvenience have consequently been caused in the handling, transport or  
30 carriage and eventual unwinding of the bobbins or like bodies.

The purpose of this invention is to provide bobbins or like bodies of yarn or thread which though generally like those hitherto  
35 formed, as aforesaid, obviate the difficulties and inconveniences experienced with them.

With the said purpose this invention consists partly in bobbins or like bodies of yarn or thread comprising coils, layers or windings of yarn or thread each of which comprises portions wound in spirals of opposite  
40 hands and extends as a whole in a spiral course of comparatively small inclination from end to end of the mass of yarn or thread in any such bobbin or the like or  
45 from or to a place at or near one end to or from a place at or near the other end or from or to a place at or near one end through the whole or a greater or less part of the  
50 length of the mass of yarn or thread, so that one part, wound later in a spiral of one hand overlaps and binds another part earlier wound in a spiral of the other hand and the parts in spirals of opposite hand crossing one another in the earlier wound coils,  
55 windings or layers prevent portions of later wound coils, windings or layers from being drawn or passing between the yarns or threads of the earlier wound coils, layers or  
60 windings and further consists in the method of and in mechanism for working a thread guide or thread guides from which yarn or thread passes to the bodies on which it is to be wound in winding such bobbins or like  
65 bodies.

The method of winding bobbins or like bodies of yarn or thread provided according to this invention consists in transmitting to the thread guide or thread guides from which yarn or thread passes to the bodies on which it is to be wound a movement brought about by compounded reciprocating  
70 movements of two parts of the mechanism used for working such thread guide or thread guides, the first of which parts, carrying and varying the position of the second part, receives a slower and longer reciprocating movement which, according as  
75 warpers' bobbins or the like or bottle bobbins or the like are intended to be wound, is of uniform extent or is of varying extent of departure from and return to one position while the second part, being movably mounted upon the first and moved upon it with a more frequently reversed movement  
80 relatively to the various positions into which it is brought in the reciprocating movement of the first part, carries the said thread guide or thread guides and transmits thereto a reciprocating motion shorter than and more frequently reversed than the reciprocating movement of the first part of the said mechanism and in the case of bobbins or other bodies of yarn or thread required to present square or flat or like ends at one  
85 end or both causing the more frequently reversed movement to be diminished in extent to a minimum or to nothing towards or at the one end or both ends of the slower and longer movement named as the case  
90 may be.

The mechanism provided according to this invention for working a thread guide or thread guides from which yarn or thread passes to the bodies on which it is to be wound in the winding of bobbins or like  
105 bodies of yarn or thread, comprises two parts of which the first carrying and varying the position of the second receives a slower and longer reciprocating movement, which according as warpers' bobbins or the like or bottle bobbins or the like are intended to be wound, is of uniform extent or is of varying extent of departure from and return to one position in the direction of the length of the portions of such bodies to be occupied by yarn or thread, while the second part, being movably mounted upon the first part and moved upon it with a more frequently reversed movement relatively to the various positions into which it is brought in the reciprocating movement of the first part, carries the said thread guide or thread guides and transmits thereto a reciprocating motion in the direction of the length of the said bodies shorter and more frequently reversed than the reciprocating movement of the first part of the mechanism and in the case of mechanism for winding bobbins or like bodies required to present flat or square  
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or approximately flat or square ends at one end or both comprises means either always to be in condition for action or to be sometimes in condition for action and at other times put out of condition for action and when in action serving for diminishing to a minimum or to nothing the more frequently reversed movement towards or at the one end or both ends of the movement of the part receiving and transmitting to the thread guide or thread guides the slower and longer reciprocating movement and may be constructed either for winding sometimes bottle bobbins and like bodies of yarn or thread and at other times warpers' bobbins or other like bodies of yarn or thread or always to wind bobbins or bodies of one or other of these kinds.

In one form of mechanism forming an example of mechanism provided according to this invention as aforesaid and itself forming part of the invention, a cam axially movable and made to revolve and more or less approximately in the form of an eccentric of the same minimum radius at all parts of its length but on its parts of greater radius increasing in one direction from the minimum radius or from a minimum eccentricity to a suitably greater eccentricity or radius is mounted and made movable axially in movable supports moved up and down by means of an appropriate traverse motion similar to any of those used in machines for winding bottle bobbins as hitherto made, and the cam being moved axially by means of a stationary incline or stationary and oppositely directed inclines and a spring to co-operate with it or them is made in its revolution and axial movement to move a thread guide or thread guides relatively to the said support or supports through different extents of movement increasing and diminishing from and to a minimum or to nothing in the movement of the support or supports from and to one end or opposite ends of its or their movement. One stationary incline is used when the movement of the thread guide or thread guides relatively to the support or supports is to be reduced to a minimum or to nothing at one end of the movement of the support or supports to form bobbins or like bodies of yarn or thread with square, flat or like ends at one end and two or more stationary inclines are used when the movement of the thread guide or thread guides relatively to the support or supports is to be reduced to a minimum or to nothing at both ends of the movement of the support or supports. When or if the mechanism is to be used sometimes for forming bobbins or like bodies of yarn or thread with ends diminishing in diameter towards their extremities at one end or both a device for example, a stop collar adjustable in position

is provided for holding the cam against axial movement. Thus this form of mechanism can be made to wind bobbins or like bodies of yarn or thread with smaller and larger ends and flat or nearly flat larger ends or cylindrical bobbins flat or nearly flat at both ends or bobbins or like bodies diminishing towards each end from a more or less cylindrical larger part either more abruptly towards one end than towards the other or equally towards each end according to the manner in which the cam and the mechanism for moving the supports carrying the cam are made to operate.

In the accompanying drawing in which the same letters and numerals of reference indicate corresponding parts in all the figures, Fig. 1 illustrates the formation according to this invention of a "bottle" bobbin with a flat or approximately flat bottom or larger end. Fig. 2 is a front elevation of part of a machine for forming "bottle" bobbins of the formation illustrated in Fig. 1. Fig. 3 is a side elevation partly in vertical section of the mechanism shown in Fig. 2 and some other parts and Fig. 4 is a side elevation partly in vertical section showing some of the parts shown in Fig. 2 taken on the plane and seen in a direction indicated by the line and arrows 4-4 of Fig. 2. Fig. 5 is a front elevation of a portion of mechanism to be substituted for a part shown in Fig. 2 in order to adapt the machine there illustrated for forming a warpers' bobbin.

In order to illustrate the formation of a bottle bobbin by the winding of a succession of series of coils, windings or layers increasing gradually from an approximate minimum to an approximate maximum and then beginning again at an approximate minimum and each comprising overlapping spirals or coils of opposite hand, diagrammatic representation is given in the left hand portion of Fig. 1 of the trace which would be made upon a horizontally travelling vertical surface by the thread guide guiding yarn or thread to the bobbin in the formation of layers, coils or windings of only four lengths arbitrarily chosen.

In the trace *a* shown in the left hand part of Fig. 1 it is indicated that the thread guide and consequently yarn guided thereby, in being moved from and to the plane indicated by the line *d d*, namely the plane of the base *b* of the bobbin or mass *c* of yarn or thread, hereinafter for simplicity called bobbin *c*, which is to be wound upon the wooden or other bobbin *b* in order to form layers, coils or windings of the four lengths indicated, receives a motion made up of two elements of movement. One of these elements of movement comprises repetitions of a sequence of gradual up and down movements from and to the basal

plane of the body and indicated by the curve *i*. The other element of the movement comprises a series of additional up and down movements which are of less extent than those in the former sequence and increase from nothing or a minimum to a maximum and again decrease to nothing or a minimum in each complete up and down movement of that sequence. Added to the first element of the movement which acting alone would give a trace corresponding to the curve *i* the second element of movement gives an additional and more frequent up and down movement gradually increasing and diminishing alternately in extent and rising to various distances from and returning to the curve *i* and thereby giving the trace *a*, so that the thread guide attains successively the maximum heights *e*, *f*, *g*, *h*.

The effect of the two elements of movement acting in combination is that the yarn is laid or wound upon the bobbin *c* in overlapping coils in each layer, coil or winding extending from the base *b* towards or to the top of the bobbin *c* or extending downwards to the base *b* and that at the base *b* of the bobbin *c* the overlapping coils of opposite hand are more closely wound than in the higher parts and the bottom of the bobbin *c* is made approximately flat and yarn wound upon the bobbin *c* when partly wound presents approximately the form indicated by full lines at the right hand of Fig. 1 and when fully wound the form indicated by the dotted lines *j*.

In each layer, coil or winding extending from the base *b* towards or to the top or extending downwards to the base *b* the overlapping coils secure in position the coils over which they are respectively laid or wound and consequently at any moment in the winding of every layer extending from the base *b* towards or to the top of the bobbin *c* or extending downwards to the base *b* every turn or coil of yarn with the exception of that in process of formation is firmly secured in position and in the completely wound bobbin the coils or windings excepting the few last turns or coils are firmly secured in position.

It will be seen from the accompanying drawing that similar effects can be obtained in the formation of bottle bobbins or the like by the winding of coils, windings or layers of different lengths extending from the points at one end of the bobbin or like body for different distances towards or to the other end of such bobbin or body in a succession of coils, windings or layers, beginning at an approximate maximum and diminishing gradually or approximately gradually to an approximate minimum and then beginning again at an approximate maximum or increasing gradually or approximately gradually from an approxi-

mate minimum to an approximate maximum and then diminishing gradually or approximately gradually to an approximate minimum or diminishing gradually from an approximate maximum to an approximate minimum and then increasing again gradually or approximately gradually to an approximate maximum as well as in the case illustrated by Fig. 1 in which each series of coils, windings or layers begins at an approximate minimum and increases gradually or approximately gradually to an approximate maximum and then begins again at an approximate minimum.

In the mechanism shown in Figs. 2, 3 and 4, *k* is a movable support furnished with a rack *l*, indicated by its pitch line in gear or engaging with a pinion *m*, indicated by its pitch circle fast on a shaft *n* mounted to be turned in the framework of the machine and made to turn backwards and forwards through different angles in different movements by any suitable mechanism such as is ordinarily used for moving the yarn guides in machines as hitherto provided for winding yarn into bottle bobbins. Another or other support or supports similar and moved similarly to the support *k* is or are provided in the machine as may be necessary according to the length of the machine and the two or more movable supports *k* are guided by any suitable means in their up and down movements.

The support *k* is provided at its upper end with a bracket *o* secured upon it as by a bolt and nut and providing a bearing in which a shaft *p* is mounted to be oscillated. *q* is one of two or more arms mounted fast on the shaft *p* and by means of holes formed in them receiving and carrying a rod *r* shown as tubular and formed with transverse holes to receive the screw threaded stems of thread guides *s* with thread guiding notches in their upper parts.

The thread guides *s* only one of which is shown, are held in positions of adjustment in the rod *r* by means of springs *t* made to bear upwardly against them and formed with saddle portions to rest upon the upper surface of the rod *r* and by means of nuts screwed upon the screw threaded stems. The other support or each of the other supports similar to the support *k* is also provided with a bracket corresponding to the bracket *o* for supporting the shaft *p* and rod *r*.

The arm *q* is formed with a slot in which is adjustably fixed a stud bearing a roller or bowl *u* made to bear upon a cam *v* larger at one end than at the other. The cam *v* is made circular at the smaller end and more and more eccentric towards the larger end but of the same minimum radius throughout its length and the increase in the eccentricity or larger radius of the cam *v* is

made very gentle near the small and more rapid towards the larger end. The cam *v* is fixed by a set screw on a shaft *w* mounted to be revolved and moved lengthwise in a bearing *x* formed in the bracket *o* and in the corresponding bracket or brackets on the other support or supports similar to the support *k*.

A spring *y* interposed between the cam *v* and the bracket *o* is provided for moving the shaft *w* and cam *v* in the direction indicated by the arrow *A*. A stop collar *v*<sup>1</sup> is secured, for example by a grub screw *v*<sup>2</sup> upon the shaft *w* in a suitable position thereon to limit to the desired extent the movement of the cam *v* by the spring *y*. At one end the shaft *w* is furnished with a cap *z* free to be turned about it and held in position by a screw made to engage a groove in the shaft *w*. The cap *z* is provided with a rounded end to bear against a stationary incline 1 formed on a plate 2 provided with curved slots allowing adjustment and bolted to a bracket 3 bolted to part of the framework of the machine. A sprocket wheel 4 is mounted around the shaft *w* and made to engage it by means of a key 5 entering a longitudinal groove 6 in the shaft *w*. The boss of the sprocket wheel 4 is provided with a circumferential groove engaged by jaws formed on an arm 7 movable around and secured by collars 8 with set screws in position longitudinally upon the shaft *p*. Advantageously the two or more bearings of the shaft *p* and the two or more bearings of the shaft *w* are formed in part as collars of spherical outward curvature mounted in cylindrical holes in the bracket *o* and the other support or supports carrying them so that binding of the shaft *p* in oscillation and of the shaft *w* in revolution and longitudinal movement may be obviated. A chain 9 passed around a chain guiding wheel 10 made to revolve about a stud adjustable and fixed in a bracket 11 secured to the support *k* and also made to pass around chain guiding wheels 12, 13 mounted to revolve about studs adjustable and fixed in a bracket 14 carried by a rail 15 forming part of the framework of the machine is made to pass around a sprocket wheel 16 fast on the shaft 17 bearing fast upon it the tin roller or pulleys 18 transmitting motion by means of bands 19 to the spindles 20 provided to receive the bobbins *C* on which yarns or threads are to be wound.

When revolved to impart motion to the spindles 20 the shaft 17, by means of the sprocket wheel 16, chain 9 and sprocket wheel 4, causes the shaft *v* to revolve and so causes the cam *r* to present different parts of its circumference to the roller or bowl *u*. When motion is transmitted to the spindles 20 motion is also transmitted to the shaft *u* in the usual way and the support *k* and the

other similar support or supports are raised and lowered as already described herein and in being raised and lowered cause the cap *z* of the shaft *w* to travel up and down along the inclined surface 1 of the plate 2 so that by the action of the spring *y* and the movement of the cap *z* against the incline 1 the shaft *w* and cam *v* while being made to revolve will be moved alternately in opposite directions and so the cam *v* will be made to present different parts of its length to the roller or bowl *u*. The upward and downward movement of the support *k* and other similar support or supports imparting similar up and down movement to the shaft *p* thereby imparts up and down movement to the rod *r* and thread guide *s* so that the thread guides *s* are moved through strokes opposite to or along the portions of the bobbins *C* on which yarns or threads are to be wound extending for greater or less distance from approximately the basal parts *b* upwardly towards or to the upper ends and downwardly again to approximately the basal parts *b*. When presenting its small and circular and concentric end to the bowl or roller *u* the cam *v* will allow the thread guides *s* to remain in one position relatively to the shaft *p* while that shaft *p* is being raised or lowered, but as the shaft *w* while being revolved in the up and down movement of the support *k* and the other similar support or supports is made to move lengthwise so as in different positions to cause the cam *v* to present different portions of its length to the roller or bowl *u* and the revolution of the shaft *w* and cam *v* causes the thread guides *s* to be raised and lowered relatively to the shaft *p* while the shaft *p* is being moved up and down and to a greater extent as the shaft *p* is in a higher position and the cam *v* is caused to present to the bowl or roller *u* a portion of greater eccentricity. The cam *v* being made to perform a number of revolutions in each ascent and descent of the shaft *p* it follows that in the winding of each layer or coil of yarn wound from the base *b* towards or to the top of a bobbin *c* and then towards the base *b* the thread guides *s* shall be made by the action of the cam *v* to rise above and descend again to the position relatively to the shaft *p* which is determined by the bowl or roller *u* bearing against the cam *r* at the parts of least radius and in every layer or winding of yarn whether extending in a direction generally upward or in a direction generally downward there shall be both upward and downward spirals overlapping so as to be secured and to be secured by one another. The cam *r* being of the same minimum radius throughout its length it follows that the thread guides *s* will not be lowered beyond the basal plane *d-d* of the bodies of yarn to be wound on the bobbins *c*.

As the cam *v* is made to increase in eccentricity more gradually at the smaller end than in parts nearer the larger end up and down movement of the thread guides *s* relatively to the shaft *p* will be smaller during the winding of yarn or thread at or near the basal parts *b* of the bobbins *c* than in the winding of yarns at parts higher up the bobbins *c* so that masses of yarn wound on the bobbins *C* shall present approximately square basal parts *b* and the bobbins *c* or bodies of yarn wound on the bobbins *C* will present approximately the formation and form illustrated by and hereinbefore described with reference to Fig. 1. Adjustment of the plate 2 presenting the incline 1 enables some adjustment to be made in the action of the cam *v*. The thread guides *s* can be adjusted in the rod *r* so as in their lowest position to lead yarns accurately to the basal parts *b* of the bobbins *c*.

Fig. 5 shows a plate 21 corresponding to the plate 2 shown in Figs. 2 and 3 but shaped to present two oppositely directed inclined surfaces 22, 23 to receive contact of the cap *z* of the shaft *w* so that in being raised from its lowest position the shaft *w* will be moved first in the direction indicated by the arrow *A* and then in the opposite direction and similarly in being lowered will also be moved in the direction indicated by the arrow *A* and then in the opposite direction so that the extent of the movement imparted by the cam *v* to the thread guides *s* will be reduced to a minimum or to nothing both towards and at the bottom and towards and at the top. By the plate 21 being substituted for the plate 2 and the mechanism which varies the extent of the upward and downward movement of the supports *k* being put out of action in the manner frequently practiced in the use of machines constructed for winding bottle bobbins the mechanism illustrated in the drawing is adapted to wind yarns or threads on to warpers' bobbins, that is to say bobbins with cylindrical barrels and radial flanges at each end, and when so used forms the yarn wound into masses which correspond at both ends to the large end of the bottle bobbin illustrated in Fig. 1.

If while the mechanism illustrated by Figs. 2 and 3 remains in condition for the supports to be moved up and down through different distances in different movements, the incline 1 be removed and the cam *v* be set as for example by adjustment of the stop collar *v*<sup>1</sup> in position to move the thread guides *s* in a uniform manner relatively to the support *k* and the other corresponding support or supports during the whole of the movement and in every position thereof the mechanism will cause yarn or thread to be wound into the form of bobbins differing from that shown in Fig. 1 by the larger

lower end being rounded or diminishing to its lowest extremity and in a similar way if the cam *v* be fixed in position to move the thread guide *s* relatively to the support *k* and the other corresponding support or supports throughout the movement and in every position thereof and the mechanism for varying the extent of the upward and downward movement of the said support or supports *k* be put out of action the mechanism can be adapted to wind yarns or threads on to spindles or paper tubes or other bodies thereon into bobbins or bodies with approximately cylindrical central parts and tapering ends but it is to be understood that use of the mechanism in these ways is not practicable in the winding of slippery yarns, such as yarns of artificial silk.

It will be seen that in winding yarns or threads on bobbins with flanges at one end or at both ends it is necessary that the secondary movement of the movable thread guides up and down relatively to the movable supports carrying them up and down through their principal movement up and down must be diminished to a minimum or to nothing for the winding of yarn or thread against the flanges or otherwise gaps would be left between the wound masses of yarn or thread and the flanges.

The details of mechanism provided according to this invention will differ widely in different cases in correspondence with the machines in which such mechanisms are to be applied and the forms of the bobbins or other like bodies of yarn or thread to be wound in such machines.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A bobbin or like body of yarn or thread comprising coils, layers or windings of yarn or thread each of which comprises portions wound in spirals of opposite hands and extends as a whole in a spiral course of comparatively small inclination from end to end of the mass of yarn or thread in such bobbin or the like or from or to a place at or near one end to or from a place at or near the other end or from or to a place at or near one end through the whole or a greater or less part of the length of the mass of yarn or thread, substantially as and for the purpose hereinbefore described.

2. The hereinbefore described method of winding bobbins or like bodies of yarn according to which mechanism for working the thread guide or thread guides from which yarn or thread passes to the bodies on which it is to be wound, is made to transmit to such thread guide or thread guides a movement brought about by compounded reciprocating movements of two parts of that mechanism of which the first

carrying and varying the position of the second, receives a slower and longer reciprocating movement which, according as warpers' bobbins or the like or bottle bobbins or the like are intended to be wound, is of uniform extent or is of varying extent of departure from and return to one position while the second part being movably mounted upon the first part and moved upon it with a more frequently reversed movement relatively to the various positions into which it is brought in the reciprocating movement of the first part carries the said thread guide or thread guides and transmits thereto a reciprocating motion shorter and more frequently reversed than the reciprocating movement of the first part of the said mechanism, substantially as and for the purpose hereinbefore described.

3. A method of winding bobbins or like bodies of yarns or threads as claimed in the preceding Claim 2, characterized by the more frequently reversed movement being diminished in extent to a minimum or to nothing towards or at the one end of the slower and longer movement named in the said Claim 2, substantially as and for the purpose hereinbefore described.

4. A method of winding bobbins or like bodies of yarns or threads as claimed in the preceding Claim 2, characterized by the more frequently reversed movement being diminished in extent to a minimum or to nothing towards or at both ends of the slower and longer movement named in the said Claim 2, substantially as and for the purpose hereinbefore described.

5. A mechanism for working a thread guide or thread guides from which yarn or thread passes to the bodies on which it is to be wound in the winding of bobbins or like bodies of yarn or thread, which comprises two parts of which the first, carrying and varying the position of the second, receives a slower and longer reciprocating movement which according as warpers' bobbins or the like or bottle bobbins or the like are intended to be wound, is of uniform extent or is of varying extent of departure from and return to one position in the direction of the length of the portions of such bodies to be occupied by yarn or thread, while the second part, being movably mounted upon the first part and moved upon it with a more frequently reversed movement relatively to the various positions into which it is brought in the reciprocating movement of the first part, carries the said thread guide or thread guides and transmits thereto a reciprocating motion in the direction of the length of the said bodies shorter and more frequently reversed than the

reciprocating movement of the first part of the mechanism, substantially as and for the purpose hereinbefore described.

6. A mechanism as claimed in the preceding Claim 5, characterized by means either always in condition for action or to be sometimes in condition for action and at other times put out of condition for action for diminishing to a minimum or to nothing the more frequently reversed movement towards or at the one end of the slower and longer reciprocating movement named in the said Claim 5, substantially as and for the purpose hereinbefore described.

7. A mechanism as claimed in the preceding Claim 5, characterized by means either always in condition for action or to be sometimes in condition for action and at other times put out of condition for action for diminishing to a minimum or to nothing the more frequently reversed movement towards or at both ends of the slower and longer reciprocating movement named in the said Claim 5, substantially as and for the purpose hereinbefore described.

8. A mechanism as claimed in any of the preceding Claims 5, 6 and 7, for winding bobbins or like bodies of yarn or thread, characterized by a cam which is axially movable and made to revolve and more or less approximately in the form of an eccentric of the same minimum radius at all parts of its length but on its parts of greater radius increasing in one direction from the minimum radius or from a minimum eccentricity to a suitably greater eccentricity or radius and is mounted and made axially movable in movable supports moved up and down by means of an appropriate traverse motion and is or may be moved axially, substantially as and for the purpose hereinbefore described.

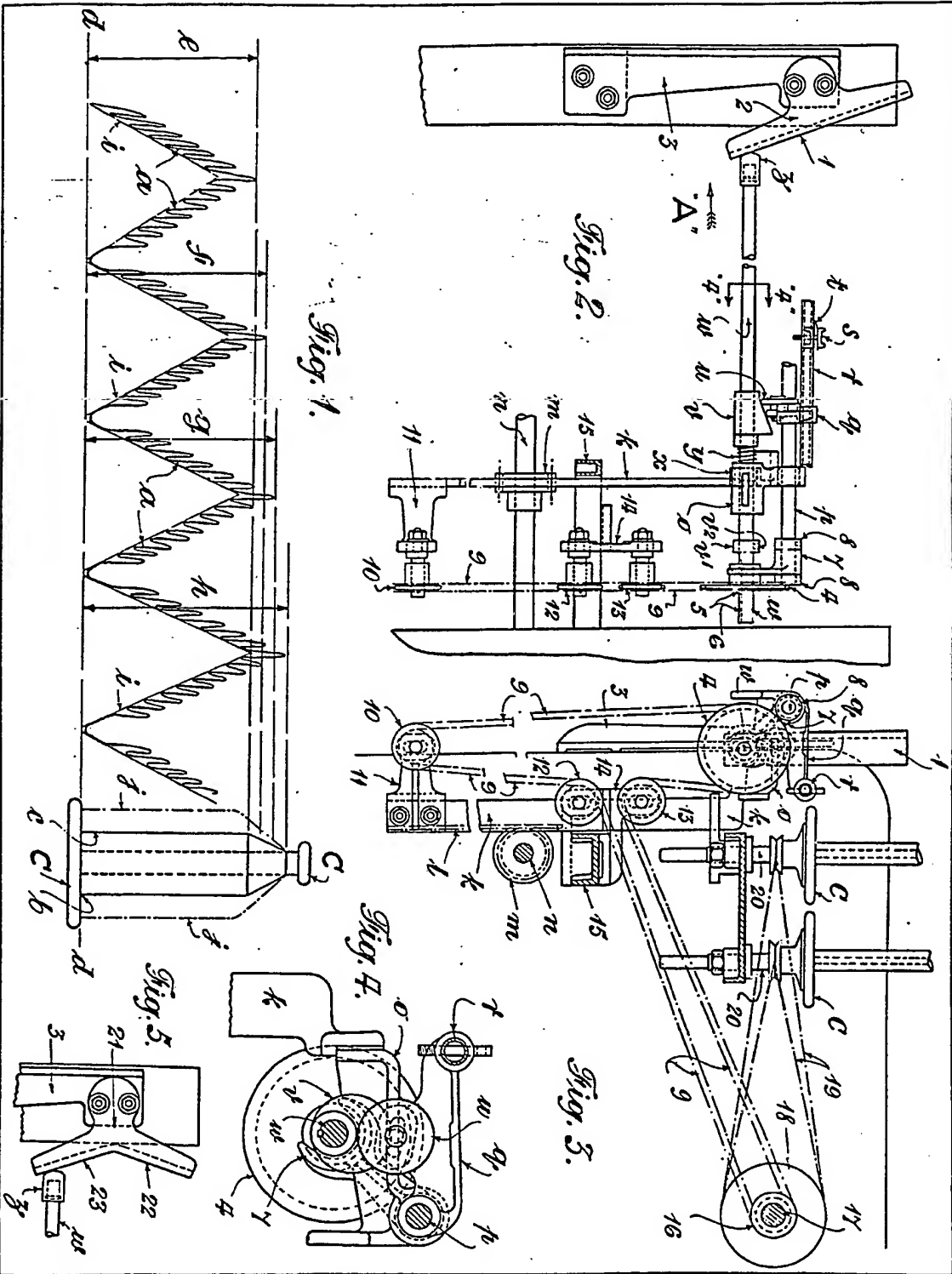
9. A mechanism for winding bobbins or like bodies of yarn or thread as claimed in the preceding Claim 8, characterized by a stationary incline or stationary inclines and a spring to co-operate with it or them for moving axially the axially movable cam, substantially as and for the purpose hereinbefore described.

10. A mechanism for winding bobbins or like bodies of yarn or thread constructed and operating substantially as and for the purpose hereinbefore described, with reference to the accompanying drawing.

Dated this 23rd day of April, 1927.

HOWARD CHEETHAM,  
Chartered Patent Agent,  
Manchester.  
Agent for the Applicant.

[This Drawing is a reproduction of the Original on a reduced scale]



[This Drawing is a reproduction of the Original on a reduced scale.]

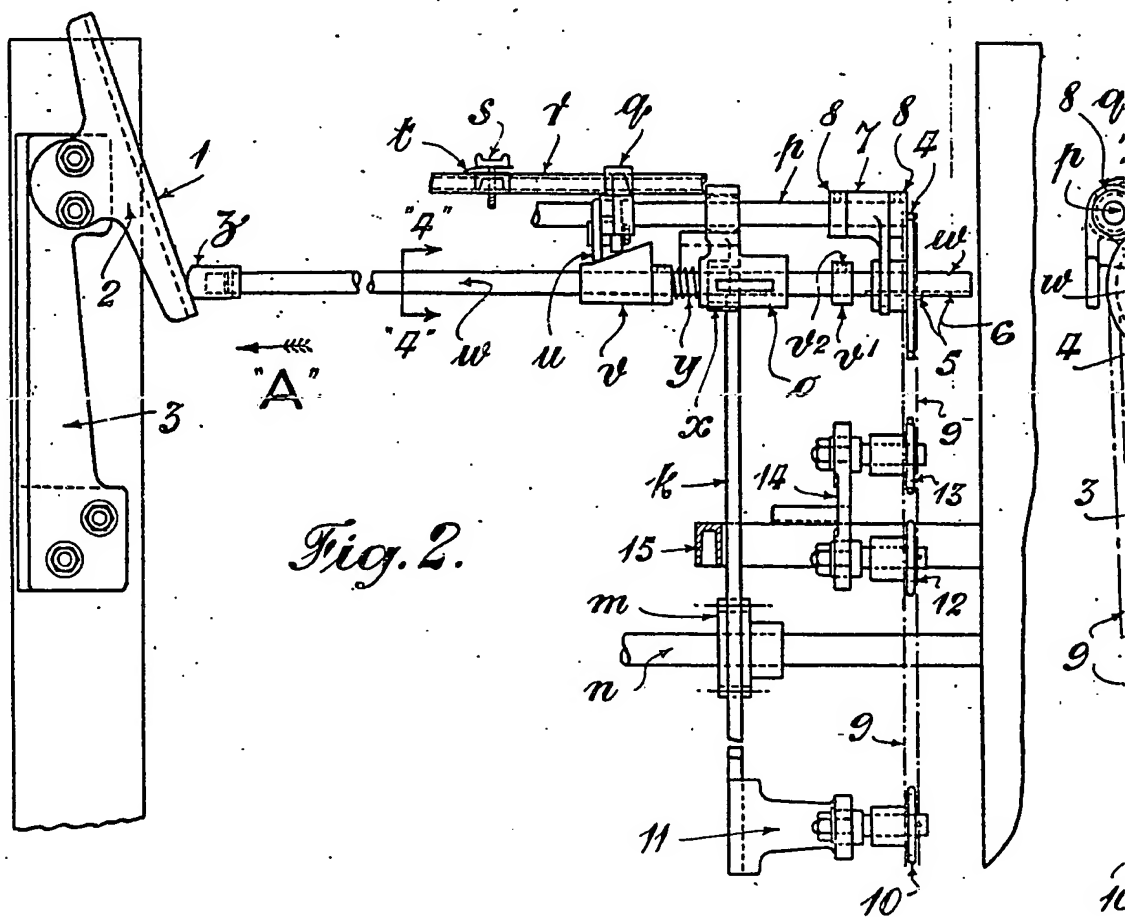
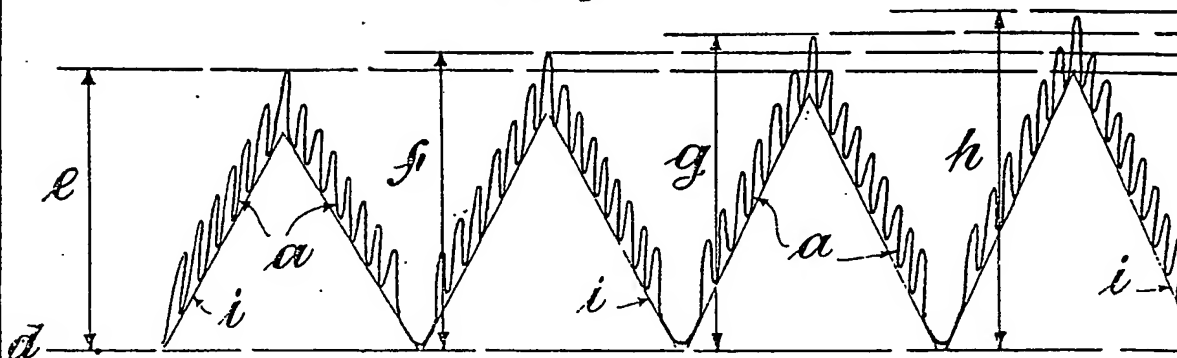


Fig. 2.

Fig. 1.





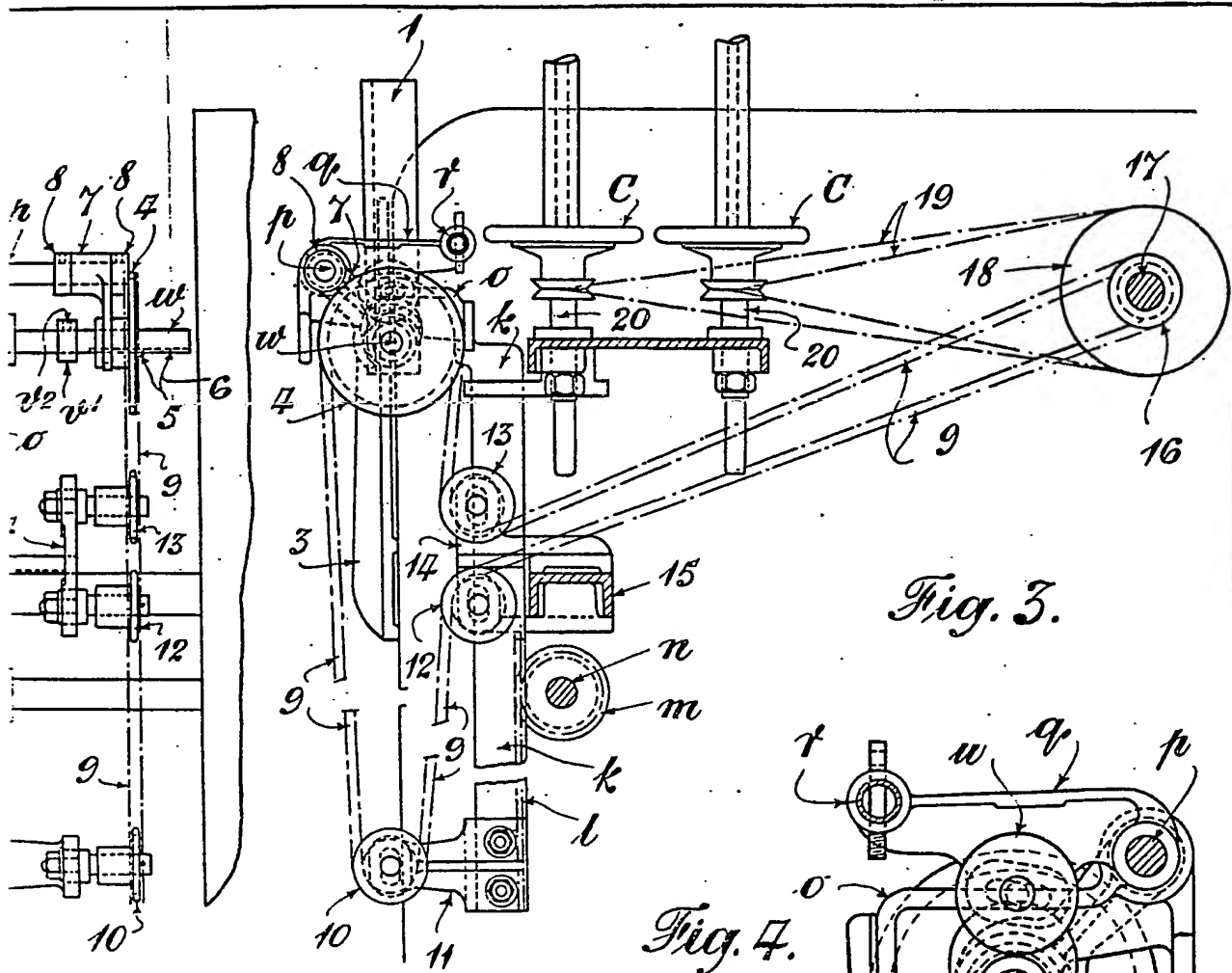


Fig. 3.

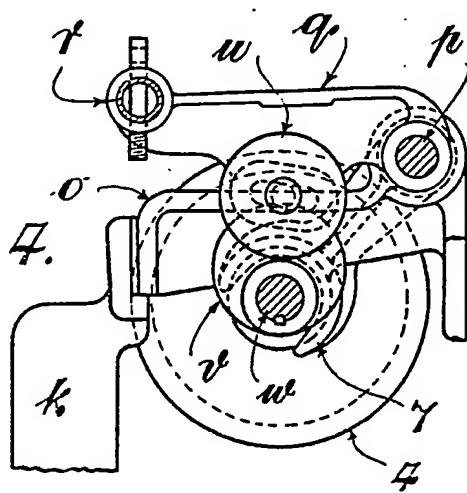


Fig. 4.

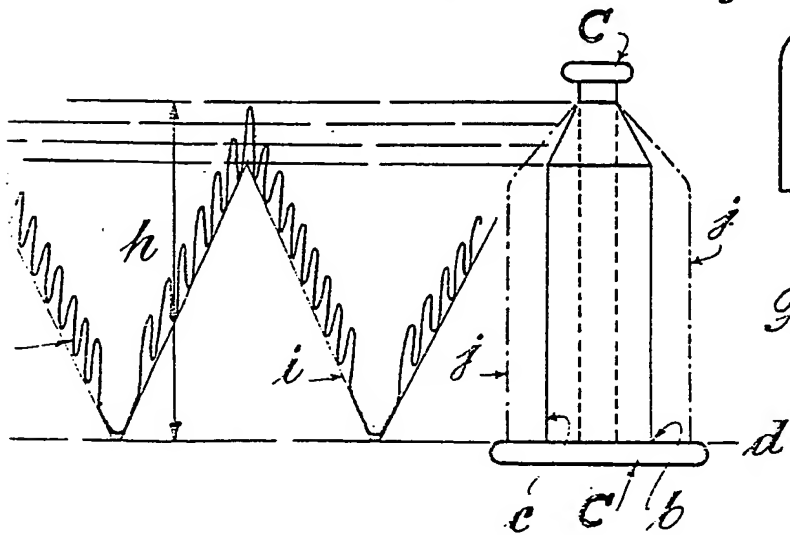


Fig. 5.

